



RESEARCH ARTICLE.....

Effect of sodium bicarbonate (NaHCO_3) on fry of rosy barb

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ABSTRACT..... The treatment of rosy barb with sodium bicarbonate brought a significant improvement in the growth in 50 mg per lit concentration. Thus, from the two experiments using 25 mg and 50 mg of sodium bicarbonate, the concentration of 50 mg/lit sodium bicarbonate was proved to be the best among the two treatments.

KEY WORDS..... Flake diet, Growth, Hardness, Slurry, Sodium biocarbonate, Rosy barb

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INTRODUCTION.....

Water quality has been found to have an impact on the life of aquatic animals. The delicate stages of the life cycle such as eggs, post embryonic larvae are very sensitive to the slight change of water quality such as pH, dissolved oxygen, carbon dioxide or toxic gases or substances. However there is a limited literature available on the effect of chemicals on the life history stages of fishes (Sawant, 1989). Sawant and Belsare (1992), reported the effect of sodium bicarbonate on the eggs and post-embryonic growth of *Brachydanio rerio*, *Cyprinus carpio*, *Labeo rohita*, *Cirrhinus mrigala* and *Catla Catla*. Palav, 1991 reported the effect of sodium bicarbonate on the finnage and colouration of Guppy fish.

High concentrations of carbondioxide suppress the dissolved oxygen absorption of fishes. It is, therefore, desired to remove excess CO_2 if its concentration rises above 10 to 15 mg/lit. Sodium carbonate or calcium hydroxide are effective in the removal of CO_2 . Sodium carbonate does not increase the pH, hence, it is preferred to use sodium carbonate rather than calcium hydroxide

(Palav, 1991).

Temporary hardness in water can be achieved by using sodium bicarbonate to change the pH slightly to the alkaline side. In the present experiment (NaHCO_3) sodium bicarbonate has been dissolved in water to study its effect on the growth of young ones. The treatment were carried out using different concentrations such as 25 mg and 50 mg per lit of water. The controls were reared in untreated fresh water.

RESEARCH METHODS.....

Brood stock of rosy barb were obtained from the local aquarium fish dealers of Ratnagiri. They were reared in the laboratory in 90 x 20 x 30 cm size glass aquaria for required experimental stage. The average length of fry were 9.00 mm and average weight of fry were 10.00 mg. The new born fry were initially fed with freshwater zooplankton and acclimated to test diet 4 days prior to the commencement of experiment. As a source of live feed, freshwater zooplankton was mass cultured using phased fertilization method (Shirgur, 1971) in plastic

Table A : Different doses of sodium bicarbonate (NaHCO ₃) incorporated diets and their ingredients			
Sr. No.	Feed ingredients	Control	NaHCO ₃ (25 mg/lit)
		All values in (%)	
1.	Fish meal	20	20
2.	Prawn shell waste	40	40
3.	wheat flour	40	40

Fish meal (bone less) : Crude protein 70 per cent Prawn shell waste : Crude protein 7 per cent Wheat flour : Crude protein 12 per cent

pool. Ten days old rosy barb were reared in the laboratory, in 90 x 20 x 30 cm size all glass aquaria.

Preparation of treatment medium :

25 mg/lit and 50 mg/lit of NaHCO₃ were used to raise the pH and total hardness to study the growth and gonado somatic index on the fry of rosy barb. The rearing medium used for the experiment was measured to 10 litre of fresh water. The control was without addition of the NaHCO₃. The rearing medium was constantly aerated, after 24 hours of stabilization of the rearing medium, the pH, total hardness and temperature were recorded and the fishes were released for treatment.

pH, total hardness and temperature were estimated by standard methods. The pH was estimated using universal indicator solution. Temperature was measured using the clinical thermometer.

Flake diet was prepared in the laboratory using different local ingredients such as bone less fish meal (20%), prawn shell waste (40%) and wheat flour (40%) (Table A). The powdered dry ingredients were passed through 0.5 mm mesh size, then they were weighed and mixed together in the mixer. The dry mixture was mixed in water and blended for 5 min. in a blender. This moistened mixture was cooked at 80° to 90°C till the slurry gets the binding property. The slurry was then cooled to ambient temperature (29 ± 1°C).

The cooled slurry was spread on a polyethylene sheet with a smooth brush and dried under fan and flakes were prepared. The flakes were packed in airtight containers and stored at room temperature and used whenever required.

A fortnightly record of the total length and weight of each fish from each group was kept from 1st day to 30 days. The average weight and length for each group of fish were recorded. For the experiment 20 fry was used for control group and treatment group and fed with flakes twice a day.

RESEARCH FINDINGS AND ANALYSIS.....

The pH of the rearing medium ranged from 7.50 to 8.50 in different concentrations of sodium bicarbonate and the pH of the control medium was 7.60 during the period of treatment.

The total hardness of the rearing medium was 52.25 mg/lit for 25 mg and 52.75 mg/lit for 50 mg. Whereas, the total hardness for untreated control was 52.00 mg/lit. It was observed that the concentrations increased the total hardness marginally.

The observations on length and weight of fishes were made for each treatment and are given (Table 1). The graphical representation of length and weight is given (Fig. 1).

In case of the treatment using 25 mg sodium bicarbonate per lit, no significant increase was observed in the body length during the first 15 days but a significant increase was observed in the body weight ($p < 0.05$) during this period of treatment. After 30 days of treatment there was a highly significant increase in the body length ($p < 0.001$) and a significant increase in the body weight ($p < 0.05$) of the young ones as compared to that of control.

The observations made on the treatment revealed that the treatment of 50 mg sodium bicarbonate was

Table 1 : Effect of sodium bicarbonate (NaHCO ₃) on fry of <i>P. conchoni</i>							
Sr. No.	Observations	Control		NaHCO ₃ (25 mg/lit)		NaHCO ₃ (50 mg/lit)	
		L (mm)	w (mg)	L (mm)	w (mg)	L (mm)	w (mg)
1.	0 days	9.00 ± 0.00	10.00 ± 0.00	9.00 ± 0.00	10.00 ± 0.00	9.00 ± 0.00	10.00 ± 0.00
2.	15 days	12.60 ± 0.38	27.60 ± 2.94	13.10 ± 0.18	35.10* ± 2.15	14.00* ± 0.39	36.30* ± 1.95
3.	30 days	14.53 ± 0.35	40.40 ± 2.44	15.80*** ± 0.28	46.93* ± 1.04	17.40** ± 0.35	59.53*** ± 11.60

ABBREVIATIONS -> ± Standard error of mean *, ** and *** indicate significance of values at $P < 0.05$, 0.01 and 0.001, respectively

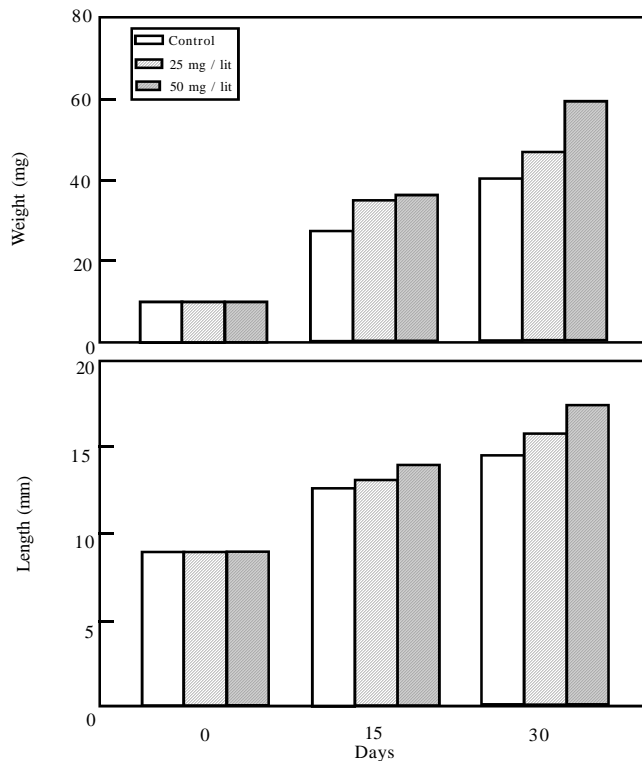


Fig. 1 : Effect of sodium-bicarbonate on fry of *P. conchoniensis*

effective and showed significant increase in body length and body weight after 15 days which further increased and showed highly significant difference in body length ($p < 0.001$), body weight ($p < 0.001$) after 30 days of treatment.

The chemical treatment of sodium bicarbonate has been reported to produce significant improvement in the

post-embryonic development at 100 to 200 mg/lit. concentrations in *Brachydanio rerio*, *Labeo rohita*, *Cirrhinus mrigala* and *Catla catla* (Sawant, 1989). Sodium bicarbonate at the dosage of 100 to 200 mg/lit. brought significant improvement on the hatching and post-embryonic growth of *Brachydanio rerio*, *Cyprinus carpio*, *Labeo rohita*, *Cirrhinus mrigala* and *Catla catla* (Sawant and Belsare, 1992).

In the present study sodium bicarbonate brought about a change in the pH of water slightly towards the alkaline thus slightly increasing the total hardness of water.

The treatment of rosy barb with sodium bicarbonate brought a significant improvement in the growth in 50 mg per lit concentration. Thus, from the two experiments using 25 mg and 50 mg of sodium bicarbonate, the concentration of 50 mg/lit sodium bicarbonate was proved to be the best among the two treatments.

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